

1       What is claimed is:

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3       1. An encoding system for determining position and position changes of  
4 a moving member, comprising:

5       a sequence of encoder marks forming incremental patterns and at least  
6 one index pattern, wherein two subsequent incremental patterns are indica-  
7 tive of an incremental position-change of the moving member and the index  
8 pattern is indicative of a reference position of the moving member;

9       a sensor arrangement viewing a section of the encoder-mark sequence,  
10 the length of which is greater than one position-change increment;

11       an analyzer arranged to analyze an encoder-mark pattern in the viewed  
12 section with regard to the incremental patterns and the index pattern and to  
13 generate, in response to a pattern match found, at least one of an incre-  
14 mental-position-change signal and an index signal.

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16       2. The encoding system of claim 1, wherein the sensor arrangement  
17 comprises a plurality of sensor elements arranged to simultaneously detect a  
18 plurality of encoder marks in the section of the encoder-mark sequence.

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20       3. The encoding system of claim 1, wherein the index pattern has a  
21 length, and the length of the viewed section corresponds to the length of the  
22 index pattern.

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24       4. The encoding system of claim 1, wherein subsequent incremental  
25 patterns overlap.

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27       5. The encoding system of claim 1, wherein the encoder marks are iden-  
28 tical.

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30       6. The encoding system of claim 1, wherein the system is a linear or an  
31 angular encoding system.

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1           7. An encoding system for determining position and position changes of  
2 a moving member, comprising:

3           a row of encoder marks arranged along the moving member in a gener-  
4 ally regular manner to provide incremental position-change information;

5           at least one index marking in the form of a predefined pattern of encoder  
6 marks which represents a disturbance of the regular encoder-mark arrange-  
7 ment;

8           a sensor arrangement viewing a section of the row of encoder marks  
9 and arranged to provide a viewed pattern of the encoder-mark section;

10          an analyzer arranged to analyze the viewed pattern to generate incre-  
11 mental-position-change signals on the basis of the encoder marks and an  
12 index signal in response to a detection of the predefined index mark pattern,

13          wherein the incremental-position-change signals are enabled to be gen-  
14 erated also in that section of the encoder-mark row in which the regular en-  
15 coder-mark arrangement is disturbed by the index marking.

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17          8. The encoding system of claim 7, wherein the sensor arrangement  
18 comprises a plurality of sensor elements arranged to simultaneously detect a  
19 plurality of encoder marks in the viewed encoder-mark section.

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21          9. The encoding system of claim 7, wherein the index marking has a  
22 length, and the length of the viewed encoder-mark section corresponds to the  
23 length of the index marking.

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25          10. The encoding system of claim 7, wherein the sensor arrangement is  
26 arranged to detect, in the viewed section, a multiplicity of encoder marks, so  
27 that the detected encoder marks carry redundant incremental position-change  
28 information at least in regions of regular encoder-mark arrangement, wherein  
29 the detection of the multiplicity of encoder marks enables the incremental-  
30 position-change signals to be generated also in that section of the encoder-  
31 mark row in which the regular encoder-mark arrangement is disturbed by the  
32 index marking.

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1           11. The encoding system of claim 7, wherein the encoder marks are  
2 equidistantly spaced in regions of regular encoder-mark arrangement.

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4           12. The encoding system of claim 7, wherein the encoder marks are  
5 identical.

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7           13. The encoding system of claim 1, wherein the system is a linear or an  
8 angular encoding system.

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10          14. An encoding system for determining position and position changes  
11 of a moving member, comprising:

12           a row of identical encoder marks forming incremental patterns and at  
13 least one index pattern, wherein two subsequent incremental patterns are  
14 indicative of an incremental position-change of the moving member and the  
15 index pattern is indicative of a reference position of the moving member;

16           a sensor arrangement detecting a pattern of a section of the encoder-  
17 mark row;

18           an analyzer arranged to analyze the detected encoder-mark pattern with  
19 regard to the incremental patterns and the index pattern and to generate, in  
20 response to an incremental-pattern match found, an incremental-position-  
21 change signal and, in response to an index-pattern match found, an index  
22 signal.

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24          15. The encoding system of claim 14, wherein the sensor arrangement  
25 comprises a plurality of sensor elements arranged to simultaneously detect a  
26 plurality of encoder marks in the section of the encoder-mark row.

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28          16. The encoding system of claim 14, wherein the index pattern has a  
29 length, and the length of the viewed section corresponds to the length of the  
30 index pattern.

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1        17. The encoding system of claim 14, wherein the sensor arrangement  
2 comprises a sensor element arranged to successively detect the encoder  
3 marks or groups of the encoder marks in the section of the encoder-mark row  
4 upon the movement of the moving member, wherein the encoding system is  
5 arranged to combine the successively detected encoder marks to form the  
6 detected encoder-mark pattern.

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8        18. The encoding system of claim 14, wherein subsequent incremental  
9 patterns overlap.

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11       19. The encoding system of claim 14, wherein the system is a linear or  
12 an angular encoding system.

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14       20. A printing device having an encoding system for determining position  
15 and position changes of a recording medium conveyor to determine the posi-  
16 tion of a recording medium placed on the conveyor, comprising:

17       a sequence of encoder marks forming incremental patterns and at least  
18 one index pattern, wherein two subsequent incremental patterns are indica-  
19 tive of an incremental position-change of the conveyor and the index pattern  
20 is indicative of a reference position of the conveyor;

21       a sensor arrangement viewing a section of the encoder-mark sequence,  
22 the length of which is greater than one position-change increment;

23       an analyzer arranged to analyze an encoder-mark pattern in the viewed  
24 section with regard to the incremental patterns and the index pattern and to  
25 generate, in response to a pattern match found, at least one of an incre-  
26 mental-position-change signal and an index signal.

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28       21. The printing device of claim 20, wherein the recording medium con-  
29 veyor is a belt conveyor.

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31       22. The printing device of claim 20, wherein the encoder-mark sequence  
32 is an encoder-mark row arranged along the recording medium conveyor.

1        23. The printing device of claim 20, wherein the printing device has a  
2 plurality of print stations arranged along the recording medium conveyor, and  
3 each print station is individually equipped with said sensor arrangement and  
4 analyzer.

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6        24. The printing device of claim 20, wherein the printing device is a  
7 page-wide ink-jet printer.

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9        25. A printing device having an encoding system for determining position  
10 and position changes of a recording medium conveyor to determine the posi-  
11 tion of a recording medium placed on the conveyor, comprising:

12        a row of encoder marks arranged along the conveyor in a generally  
13 regular manner to provide incremental position-change information;

14        at least one index marking in the form of a predefined pattern of encoder  
15 marks which represents a disturbance of the regular encoder-mark arrange-  
16 ment;

17        a sensor arrangement viewing a section of the row of encoder marks  
18 and arranged to provide a viewed pattern of the encoder-mark section;

19        an analyzer arranged to analyze the viewed pattern to generate incre-  
20 mental-position-change signals on the basis of the encoder marks and an  
21 index signal in response to a detection of the predefined index mark pattern,

22        wherein the incremental-position-change signals are enabled to be gen-  
23 erated also in that section of the encoder-mark row in which the regular en-  
24 coder-mark arrangement is disturbed by the index marking.

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26        26. The printing device of claim 25, wherein the recording medium con-  
27 veyor is a belt conveyor.

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29        27.. The printing device of claim 25, wherein the printing device has a  
30 plurality of print stations arranged along the recording medium conveyor, and  
31 each print station is individually equipped with said sensor arrangement and  
32 analyzer.

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1        28. The printing device of claim 25, wherein the printing device is a  
2 page-wide ink-jet printer.

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4        29. A printing device having an encoding system for determining position  
5 and position changes of a recording medium conveyor to determine the posi-  
6 tion of a recording medium placed on the conveyor, comprising:

7        a row of identical encoder marks forming incremental patterns and at  
8 least one index pattern, wherein two subsequent incremental patterns are  
9 indicative of an incremental position-change of the conveyor and the index  
10 pattern is indicative of a reference position of the conveyor;

11        a sensor arrangement detecting a pattern of a section of the encoder-  
12 mark row;

13        an analyzer arranged to analyze the detected encoder-mark pattern with  
14 regard to the incremental patterns and the index pattern and to generate, in  
15 response to an incremental-pattern match found, an incremental-position-  
16 change signal and, in response to an index-pattern match found, an index  
17 signal.

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19        30. The printing device of claim 29, wherein the recording medium con-  
20 veyor is a belt conveyor.

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22        31. The printing device of claim 30, wherein the encoder-mark row is ar-  
23 ranged along the recording medium conveyor.

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25        32. The printing device of claim 30, wherein the printing device has a  
26 plurality of print stations arranged along the recording medium conveyor, and  
27 each print station is individually equipped with said sensor arrangement and  
28 analyzer.

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30        33. The printing device of claim 30, wherein the printing device is a  
31 page-wide ink-jet printer.

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1        34. A method of determining position and position changes of a moving  
2 member using a sequence of encoder marks which forms incremental pat-  
3 terns and at least one index pattern, wherein two subsequent incremental  
4 patterns are indicative of an incremental position-change of the moving mem-  
5 ber and the index pattern is indicative of a reference position of the moving  
6 member, comprising the steps:

7        viewing a section of the encoder-mark sequence, the length of which is  
8 greater than one position-change increment;

9        analyzing a encoder-mark pattern in the viewed section with regard to  
10 the incremental patterns and the index pattern; and

11        generating, in response to a pattern match found, at least one of an  
12 incremental-position-change signal and an index signal.

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14        35. A method of determining position and position changes of a moving  
15 member using a row of encoder marks arranged along the moving member in  
16 a generally regular manner to provide incremental position-change informa-  
17 tion; at least one index marking in the form of a predefined pattern of encoder  
18 marks which represents a disturbance of the regular encoder-mark arrange-  
19 ment, comprising the steps:

20        viewing a section of the row of encoder marks;

21        providing a viewed pattern of the encoder-mark section;

22        analyzing the viewed pattern to generate incremental-position-change  
23 signals providing the incremental position-change information on the basis of  
24 the encoder marks and an index signal in response to a detection of the pre-  
25 defined index mark pattern,

26        wherein the incremental-position-change signals are enabled to be gen-  
27 erated also in that section of the encoder-mark row in which the regular en-  
28 coder-mark arrangement is disturbed by the index marking.